URBAN DEVELOPMENT STANDARDS

A REVIEW

Ontario
Ministry of
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and Housing

June 1982

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PREFACE

This review has been undertaken to ensure that the proposals of the *Urban Development Standards* study published by the Ministry of Housing in March 1976 are still appropriate and compatible with current trends in innovative subdivision design practice.

The review also examines two other areas of concern related to the study. The first is an examination of the fiscal impact of the study proposals on municipalities. This has been carried out in response to requests from several municipalities which have expressed concern that subdivisions built to the proposed standards would generate less revenue relative to costs than standard subdivisions. This part of the review was prepared by Clayton Research Associates Ltd.

Another area of growing concern since the publication of the study is energy conservation. Accordingly, this review also includes an examination of possible energy savings due to the use of less materials for hard services in subdivisions built to the proposed standards. This part of the review was prepared by Middleton Associates.

The review has found that the basic proposals of the study are still valid. The proposed subdivisions have almost the same fiscal impact on municipalities as standard subdivisions. In addition, important energy savings are obtainable through the use of less materials for hard services.

It is hoped that municipalities, planners, engineers, land developers and others involved in the planning, development and approval of subdivision developments will find this document useful in their ongoing review of development standards.

G. Keith Bain
Director
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June 1982

SUMMARY

This report reviews the major proposals contained in the *Urban Development Standards* study published by the Ministry of Housing in March 1976. In addition, it examines the fiscal impact of the study proposals on municipalities, as well as some of the energy savings possible due to the use of less materials for hard services.

The major findings of the standards review are:

- Subdivisions employing standards of the type proposed in the *Urban Development Standards* study have become commonplace in most areas of the province.

- While there are differences in the specific standards used, the standards proposed in the study are in line with current trends in innovative subdivision development.

- The examination of recent developments using reduced standards has indicated the strong need to employ Comprehensive Planned Development techniques to ensure privacy, aesthetics and a properly functioning development.

- Some flexibility is needed in applying the standards to recognize specific local conditions, particularly with respect to the storm drainage system and road allowance and pavement widths.

The major findings of the fiscal impact analysis are:

- Subdivisions with proposed standards generate significantly more municipal revenue than do subdivisions with conventional standards, but involve a higher level of municipal costs as well.

- Overall, the net fiscal impact of subdivisions with the proposed standards appears to be similar to that for subdivisions with conventional standards.

- While these findings are considered applicable to many municipalities, differences among municipalities preclude an automatic acceptance of these findings for each and every municipality in the province.

The major findings of the energy impact analysis are:

- Significant reductions in the capital energy required result if the proposed subdivisions are developed, rather than the conventional ones. These savings are more than 40% of the capital energy of the conventional subdivisions, and amount to 1% to 1.3% of the space heating demand over the 60-year life of the subdivision.

- Operating energy savings are of several types. Small savings are associated with street lighting, street maintenance and water pumping within the subdivision. Other operating savings, such as transportation savings, may accrue but will depend on the pattern of development around the subdivision and, thus, cannot be estimated from a consideration of the subdivision alone.

1. INTRODUCTION

Urban Development Standards was published by the Ministry of Housing in March, 1976. Its purpose was to demonstrate how changes to current subdivision site planning and engineering standards could help reduce the cost of new housing.

At the time the report was published, there were only a handful of subdivisions in Ontario employing standards of the type being proposed in the report. Since then, however, subdivisions incorporating standards similar to those proposed in the report have become commonplace in most areas of the province.

Because of the increase in the number of developments employing the proposed standards, it was felt that a review of the report was in order to ensure that its recommendations still reflected the most current design practices. The second chapter of this report reviews the major planning and engineering proposals of the *Urban Development Standards* study.

Also, since the publication of the report, there have been suggestions that there should be an analysis of the financial impact on municipalities of subdivisions built using the proposed standards. These requests have arisen out of concerns that subdivisions built to the proposed standards would not generate as much revenue as compared to costs as traditional subdivisions. The third chapter of this report includes an analysis of the comparative costs and revenues of both types of subdivisions for two typical municipalities.

Another issue that has grown in importance since the publication of the report is energy conservation. It was felt that an analysis of the energy savings possible by employing the proposed standards due to the use of less material for such hard services as roads, sewers and service connections would be useful. The fourth chapter of this report deals with these energy savings.

STANDARDS REVIEW

2. STANDARDS REVIEW

A basic source of information for the standards review was the original comments made on the report after it was published. These responses came from a wide range of groups and individuals including municipal officials and representatives, architects, engineers, planners, developers and other interested groups. These comments have been taken into account in this part of the review.

Ministry staff have been involved in several seminars and workshops dealing with this topic in the past six years. The comments and submissions made as a result of these meetings have also been considered.

One of the most important sources of information was *Urban Development Standards — A Detailed User Survey*, a report published by the Ministry of Housing in September 1979. This report included the results of a survey of the larger municipalities in the province with respect to their current and proposed planning and engineering standards and their innovative subdivisions.

More recently, field visits were carried out in several municipalities in 1981 to examine on a first-hand basis some of the latest developments incorporating aspects of the *Urban Development Standards* study. This included, in most cases, discussions with the municipal planners and engineers as to their views of the developments and the standards used.

Site Planning Standards

The review of the site planning standards was aimed primarily at determining whether or not the lot sizes proposed in the original report were reasonable with respect to current design practice. The lot size standards were identified in the report as being the major cost-saving feature of the proposed standards. The report proposed two sets of standards, one for the larger Metropolitan areas, and one for Ontario-wide use. (TABLE 1).

Many submissions commented on the minimum lot size standards. The general consensus appeared to be that the Metropolitan standards were a little too small while there was general agreement that the Ontario standards were acceptable.

From the information obtained in the *Detailed User Survey* and from recent field inspections, it was found that the *minimum* lot size for single-family units in Metropolitan areas varied from 2280 ft^2 (212 m^2) to about 3000 ft^2 (279 m^2). The *minimum* proposed lot size for single-family houses in the *Urban Development Standards* study of 2400 ft^2 (223 m^2) is within the current range, although near the bottom. There is, therefore, no need to alter the proposed planning standards for Metropolitan areas.

It is recognized that a subdivision built entirely using the proposed minimum lot sizes could result in a very tight development with some design problems. However, in the sample design used in *Urban Development Standards,* not all of the lots were of the minimum size. The *average* lot size of single-family units in the proposed Metropolitan design was actually about 2740 ft^2 (255 m^2); semi-detached lots 2600 ft^2 (292 m^2); link houses 2370 ft^2 (220 m^2); and townhouses 1580 ft^2 (137 m^2).

While it is possible to adequately site a house on the minimum proposed lot size, the use of lots larger than the minimum allows for greater flexibility in

the overall design. This frees the designer to better co-ordinate unit to unit placement for aesthetics and privacy. In fact, in considering small lot zoning, a minimum *average* lot size, as well as a minimum lot size, should also be included to provide flexibility for the designer.

TABLE 1

MINIMUM LOT SIZES

UNIT TYPE	METROPOLITAN	ONTARIO
Single-family	30 ft x 80 ft (9.1 m x 24.4 m) — 2 400 ft² (223 m²)	30 ft x 100 ft (9.1 m x 30.5 m) — 3 000 ft² (279 m²)
Semi-detached	30 ft x 80 ft (9.1 m x 24.4 m) — 2 400 ft² (223 m²)	26.5 ft x 100 ft (8.1 m x 30.5 m) — 2 650 ft² (246 m²)
Link House	28.5 ft x 80 ft (8.7 m x 24.4 m) — 2 280 ft² (212 m²)	26 ft x 100 ft (7.9 m x 30.5 m) — 2 600 ft² (242 m²)
Townhouse	18 ft x 80 ft (5.5 m x 24.4 m) — 1 440 ft² (134 m²)	21 ft x 100 ft (6.4 m x 30.5 m) — 2 100 ft² (195 m²)

This point brings up the need to emphasize another major design consideration of the report. It is imperative that, when designing small lot subdivisions, Comprehensive Planned Development (CPD) techniques are used. The CPD techniques ensure that houses and lots are properly oriented to each other and carefully planned out in the preparation of the overall site design. This is crucial when designing compact subdivisions in order to ensure privacy, aesthetics and a properly functioning development, and cannot be emphasized too much. The use of CPD techniques for small lot developments should become common municipal planning practice. The examination of recent subdivisions has shown that, where CPD techniques have been used, a superior development is produced.

As indicated earlier in this chapter, there has been general consensus that the Ontario proposed planning standards are acceptable. The *Detailed User Survey* and recent field trips have confirmed this, and there is no need seen to alter these standards.

There are other considerations besides physical ones to be taken into account when considering subdivision design standards and densities. Among the reasons which prompted the undertaking of the original report were concerns over the high cost of land in urban areas and the need to conserve agricultural land. These concerns are even more applicable today. Also, since the publication of this report, energy concerns have become a major consideration in practically all aspects of housing development. Housing developments built to higher densities have been shown to be more

energy-efficient than lower density ones[1]. All of these reasons give added weight to the need to maintain densities as high as practical.

Engineering Servicing Standards

The review of engineering servicing standards, like the review of site planning standards, concentrated on the areas of greatest cost-savings, i.e. the storm drainage system, road allowance and pavement widths and the method of making service connections to individual lots. The same engineering standards were proposed for both Metropolitan areas and Ontario-wide use.

i) Storm Drainage Standards

The *Urban Development Standards* study proposed a storm drainage system which eliminates a gravity storm drainage connection from the house to the storm sewer by discharging roof drains to the ground and by having weeping tile flows directed to a sump and pumped to the ground. This was in contrast to the system commonly being used by many municipalities at that time, of draining both roof drains and weeping tiles directly by a gravity service connection to large storm sewers.

The results of the *Detailed User Survey* indicated that there is a growing trend in Ontario municipalities towards the type of system proposed in the *Urban Development Standards* study. Approximately one-half of the municipalities responding to the *Detailed User Survey* indicated that they were either already using a system similar to the report's recommendations or were considering doing so.

There were some concerns raised in the submissions about the use of a sump pump for weeping tile drainage. Although there are some drawbacks to the use of a sump pump, it has been found to be an acceptable system in several municipalities in Ontario and is continuing to be used. There may be situations, however, where physical conditions could prevent the use of a sump pump and other techniques for foundation tile drainage must be found. Also, it is recognized that other techniques such as the "third pipe" system can provide for basement flooding protection at lower cost than the traditional system and may be appropriate. However, it is felt that, for most areas of the province, the system proposed is acceptable. In addition, as indicated in the original report, it is a very cost-effective method of dealing with this problem. There is, therefore, no need to alter the proposals of that section of the report.

ii) Road Allowance and Pavement Widths

This section of the review examines the proposed road allowance and pavement widths of the *Urban Development Standards* study. Pavement widths are included even though they were not identified as a major cost saving item because they are an integral part of the road allowance and have received considerable attention in some of the submissions received on the original report.

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[1]Ministry of Municipal Affairs and Housing, *Residential Site Design Alternatives in Small Communities.* September, 1981.

The proposed breakdown for road classification types, road allowance widths and pavement widths was as follows:

TABLE 2

ROAD CROSS-SECTION STANDARDS

	CRESCENT P-LOOP CUL-DE-SAC	LOCAL	COLLECTOR	NEIGH-BOURHOOD COLLECTOR	COLLECTOR
NO. OF UNITS	0-100	0-150	150-350	350-450	450+
RIGHT OF WAY					
— conventional	66 ft (20.1 m)	66 ft (20.1 m)	66 ft (20.1 m)	76 ft (23.2 m)	— —
— proposed	50 ft (15.2 m)	56 ft (17.1 m)	66 ft (20.1 m)	70 ft (21.3 m)	80 ft (24.4 m)
PAVEMENT WIDTH					
— conventional	28 ft (8.5 m)	28 ft (8.5 m)	28 ft (8.5 m)	36 ft (11.0 m)	— —
— proposed	26 ft* (7.9 m)	28 ft (8.5 m)	28 ft (8.5 m)	32 ft (9.8 m)	42 ft (12.8 m)

*For cul-de-sacs less than 350 ft (107 m) long to bulb and with less than 40 units, use 24 ft (7.3 m) pavement width, and with no sidewalks unless through pedestrian passage is required.

There was a general concern in the comments received to reduced road allowance and pavement widths. The objections related to the fact that not enough room would be available for underground services, large service vehicle manoeuvering, on-street parking and, most particularly, snow ploughing and storage.

Reduced road allowance and pavement widths have been commonly used in several municipalities in Ontario for many years without any apparent major problems. The *Detailed User Survey* indicated that there were no common standards being applied by those municipalities which allow road allowances below 66 ft (20.1 m) although the 56 ft (17.1 m) wide standard for local roads appears to be the most common.

The *Detailed User Survey* also revealed that approximately one-third of the municipalities responding were considering some reductions to their standard road allowance. In many cases, however, these were being done with respect to specific subdivision applications only and were not part of a general reduction in standards. Proposed reductions in pavement widths is not as popular, although several municipalities have permitted pavement widths similar to those proposed in the original report and a few others are considering it. Overall, however, there is no doubt that there is a general trend toward reductions in road allowance widths and, to a lesser extent, in pavement widths.

Since the publication of the report, energy concerns have led to a rapid increase in the sale and manufacture of smaller cars. Since compact cars will undoubtedly constitute the majority of car types within a very few years, many of the concerns about lack of room for parking and manoeuvering will be reduced. It is likely that servicing vehicles will also be smaller in the future. This, in addition to the fact that those municipalities which have already permitted reduced road allowance and

pavement widths appear satisfied with their performance, would tend to support the proposals of the report.

The use of reduced road allowances is an important feature in achieving higher density since they constitute a large part of any development. As indicated in the section on site planning standards, the need to achieve higher overall densities in residential development is greater than ever. In light of the above, it would appear that the road allowance and pavement widths proposed in the original report are reasonable with respect to the types of innovative development currently being built or contemplated. However, it is recognized that there is no exact standard for every situation and some modifications for local concerns will be necessary. This is particularly true for those municipalities experiencing exceptionally high snow falls.

iii) Service Connections

The *Urban Development Standards* study proposed that service connections for water and sanitary services be "dualed", i.e. one lateral connection servicing two units and, furthermore, that these laterals be placed in a common trench. This was in contrast to the most commonly used method which had individual laterals in separate trenches.

There has been considerable opposition from municipal engineers to these proposals, particularly to the use of dual servicing. The results of the *Detailed User Survey* indicated that the large majority of municipalities in Ontario do not permit dual services. Among those that do, the practice varies, some dualing both, some only the sanitary service, and others only the services for semis and townhouses. The use of a common trench for services is, however, quite common.

There are two major concerns with respect to dualing. The first is that a blockage resulting from one unit can disrupt service in the other and, perhaps, result in legal ramifications and responsibilities to the municipality. The other is the problem of noise transfer from one unit to the other through the common connection. The concern with the use of a common trench is that maintenance operations on one service could accidentally cause damage to the other.

To a great extent the severity of these problems appears to be a matter of perspective. Among municipalities which allow dualing and common trenches, problems of the above nature are not serious enough to be unacceptable to the municipalities. However, to some municipalities any problems at all may be too great, if they can be eliminated by the use of a single service and/or separate trench. This, however, adds extra costs to the developer and, ultimately, the homeowner.

While the use of dual services and common trenches does not represent cost savings of the magnitude of the other standards examined in the report, they are nevertheless large enough to be recognized as a significant area of cost savings. The use of dual servicing and common trenching, despite some drawbacks, is felt to be an acceptable practice, and municipalities are encouraged to use them. There is also an advantage to the municipality in adopting these procedures in that the use of dual services and common trenches causes less disruption to the road bed, thus reducing future municipal maintenance costs. This is particularly true for small lot developments.

Conclusions

The purpose of this part of the review has been to determine if the proposals of the *Urban Development Standards* study are still appropriate and in line with current innovative subdivision design practice.

The main conclusions are:

- Subdivisions employing standards of the type proposed in the *Urban Development Standards* study have become commonplace in most areas of the province.

- While there are differences in the specific standards used, the standards proposed in the study are in line with current trends in innovative subdivision development.

- The examination of recent developments using reduced standards has indicated the strong need to employ Comprehensive Planned Development techniques to ensure privacy, aesthetics and a properly functioning development.

- Some flexibility is needed in applying the standards to recognize specific local conditions, particularly with respect to storm drainage systems and road allowance and pavement widths.

In conclusion, the review indicates that the proposals of the *Urban Development Standards* study are generally appropriate, and no major changes are needed.

FISCAL IMPACT REVIEW

3. FISCAL IMPACT REVIEW[1]

Although the *Urban Development Standards* study recognized that subdivisions with the proposed set of development standards might have detrimental long term fiscal impacts on local and regional municipal governments, no attempt was made to estimate these impacts. If subdivisions with proposed standards are *perceived* to have detrimental fiscal impacts (i.e. to generate less municipal revenue relative to costs than subdivisions with conventional standards), many municipalities may be reluctant to approve the development of subdivisions with proposed standards. If this perception is incorrect (i.e. if the net fiscal impact of subdivisions with proposed standards is the same or more favourable than those with conventional standards), the development cost savings that could be realized from subdivisions with proposed standards might not be obtained because of a refusal by municipal officials to allow these subdivisions to be developed.

The objective of this part of the review was to determine whether subdivisions with the proposed standards do, in fact, generate less revenue relative to costs than do subdivisions with conventional standards.

Methodology Used for the Fiscal Impact Analysis

As previously mentioned, the objective of this part of the review was to determine whether subdivisions with the proposed standards generate less revenue relative to costs than do subdivisions with conventional standards. The methodology used to meet this objective is discussed in this section.

i) Unit of Analysis

The unit of analysis for this review was a hypothetical 200-acre site developed with the same dwelling unit configurations as proposed in the *Urban Development Standards* study. The year of the development was assumed to be 1979. This year was chosen since it was the latest year for which a complete set of municipal cost and revenue data was available at the time research for this review was undertaken.

ii) General Net Fiscal Impact Approach

The approach used in this review was to determine the long-run incremental costs and revenues to the local and regional municipality associated with the four alternative types of development under the assumption that each was developed in 1979. For simplicity, the transitional costs and revenues associated with a subdivision while it is actually being developed were ignored.

It should be noted that this analysis did not consider the net fiscal impact of the alternative subdivisions on school boards. This is because differences between the subdivisions with conventional and proposed standards will not generally result in significant differences in school board finances. Under the current provincial grant structure,[2] common tax mill rates are established throughout the province and applied to each school board's equalized assessment. The difference between the school

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[1]Details of the methodology used for the analysis are available upon request from the Local Planning Policy Branch.

[2]Details of the Ministry of Education grant structure are provided in the publication entitled *Provincial Financial Assistance to Municipalities, Boards and Commissions*, Ministry of Intergovernmental Affairs, July 1980.

board taxes based on this assessment and approved school board expenditures are fully met by the province in the form of grants. This implies that school boards which have residential subdivisions with a relatively low taxable assessment per student will receive provincial grants to offset the assessment deficiencies. Because of this, the assessment differences between subdivisions with conventional and proposed standards noted in the final section of this chapter have a very small impact on school board finances.

iii) Location of the Development

For purposes of this analysis, the location of the development site is important because the cost and revenue estimates had to be based on actual costs and revenues of local and regional governments. In addition, the dwelling unit configurations outlined in the *Urban Development Standards* study differ depending on whether the Metropolitan or Ontario standards are used.

The location of the subdivisions with Metropolitan conventional and proposed standards was assumed to be in the City of Brampton in the Regional Municipality of Peel. Brampton is located in the western portion of the Toronto Census Metropolitan Area (CMA). Because Brampton is part of the Toronto CMA, it was considered to be a good example of a municipality with Metropolitan standards. In 1979 the population of Brampton was approximately 129 000 persons.

The location of the subdivisions with Ontario conventional and proposed standards was assumed to be the Bowmanville area of the Town of Newcastle in the Regional Municipality of Durham. Bowmanville is located just east of Oshawa and had a 1979 population of approximately 13000 persons. The Town of Newcastle as a whole had a 1979 population of approximately 32000 persons.

There is typically a great deal of variation among Ontario municipalities with respect to many of the variables examined in this analysis. For example, differences in municipal service levels among municipalities dictate differences in the expenditures required to finance services for new development. Similarly, differences among municipalities with respect to residential and non-residential assessment, the mix of revenue sources, the level of grants and lot levy policies would tend to result in different fiscal impact estimates among municipalities. Because of these differences, together with the fact that this analysis focuses on the fiscal impact of the alternative subdivisions in only two Ontario municipalities, conclusions should not be automatically acceptable as being applicable to all Ontario municipalities.

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iv) Overall Comparisons

The comparisons made in this analysis are reported in terms of annual revenues and costs generated as a result of the particular subdivision being developed in 1979. It was assumed that these annual revenues and costs remain constant over time in terms of 1979 dollars. While this assumption could be questioned, alternative assumptions would have required predictions with respect to changes in government policy, changes in municipal expenditure patterns and changes in municipal development patterns and the associated impact on municipal finances. Predictions of this nature were beyond the terms of reference for this part of the review.

One change in government policy, however, was incorporated in the revenue estimates. Since 1979 there has been a significant change in the method of determining the *grant rate* of the Resource Equalization Grant. In this analysis, the 1981 method of determining the grant rate was used because it was one government policy change which was known to have taken place. Aside from this, the comparisons reflect the development of the alternative subdivisions in 1979.

v) Revenue Estimates

Municipalities typically receive revenue from a number of sources including property taxes, user charges, grants from other levels of government and lot levies.

The revenue estimates for the four types of subdivisions examined in this analysis were based primarily on information provided in the 1979 Financial Information Returns, Financial Reports and Provincial Grant Entitlement Forms of the City of Brampton, the Town of Newcastle and the Regional Municipalities of Peel and Durham.

The procedure used to estimate the revenues generated for each subdivision was to first determine the characteristics of each subdivision in terms of population and the assessed values of dwelling units and then to derive revenue estimates by source of revenue based on these characteristics.

With the exception of residential lot levies, all revenues included in this analysis were received by local and regional municipalities on an annual basis. Residential lot levies, on the other hand, are once-only revenues. Because of this the revenues generated by residential lot levies cannot be directly compared to the annual revenues generated by the alternative subdivisions. For purposes of this analysis, the once-only lot levy revenues were converted into an annual revenue equivalent so that comparisons could be made. The procedure used was to apply a *real* interest rate of 5% to the lot levies to convert them into an annual revenue stream.[1] The interest rate used in the conversion was low in relation to market interest rates because the latter reflect not only the real rate of interest but also a premium to compensate for the impact of inflation on the purchasing power of money.[2]

vi) Cost Estimates

Municipalities typically incur both operating and capital costs on behalf of their residents. Operating costs are costs such as wages, salaries and the purchase of supplies and materials which are paid on a regular basis. Capital costs, on the other hand, include the costs associated with the purchase of an asset such as a building, which has a relatively long life span.

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[1]The real rate of interest is the difference between the market rate of interest and the rate of inflation.

[2]Two examples might help clarify this procedure. Assume that the market rate of interest is 20%, the rate of inflation 15%, and that the municipality receives lot levy revenues of $1000. If the municipality invests the $1000 at the 20% interest rate, it would receive $200 at the end of the year. However, during the course of the year the purchasing power of the original $1000 decreased by 15% as a result of inflation and was, thus, worth only $850 by year end. The $850 plus the $200 received in interest totals $1050, or a 5% real rate of return on the original $1000 invested. On the other hand, if the municipality spent the lot levies, it would not be required to borrow the funds spent. In this case, it would save itself real interest charges of 5% per annum.

The operating cost estimates for the four types of subdivisions examined in this analysis were based primarily on information provided in the 1979 Financial Information Returns and Financial Reports of the City of Brampton, the Town of Newcastle and the Regional Municipalities of Peel and Durham. A three-step procedure was used. First, the operating costs of providing specific services to existing residents of a municipality were estimated on a per capita or per household basis depending on the service in question. These per capita or per household cost estimates were then applied to the population and household estimates for the alternative subdivisions examined in this analysis to obtain a total operating cost per subdivision.

As a third step, operating cost revisions for a number of services were made for the subdivisions with proposed standards. These revisions were undertaken to reflect the differences between the two types of subdivisions and were based on qualitative judgments regarding financial impacts which would result from density and engineering differences between the conventional and proposed standards.

The capital cost estimates for the four types of subdivisions examined were derived from a number of previous studies undertaken in each of the municipalities. These studies provided per capita or per household estimates of the capital costs associated with new subdivisions in the City of Brampton and the Town of Newcastle. The per capita and per household cost estimates were applied to the population and household estimates for the alternative subdivisions examined in this analysis to obtain preliminary total capital costs per subdivision. Cost revisions were then undertaken for subdivisions with proposed standards based on qualitative judgments regarding the financial impacts which would result from density and engineering differences between the conventional and proposed standards.

The procedure used to convert capital costs into an annual cost equivalent was the same as that used to convert residential lot levies into an annual revenue equivalent. That is, a real interest rate of 5% was applied to the capital cost estimates to transform them into an operating cost equivalent.

The cost estimates which were made were based on a number of assumptions and judgments and for this reason should be viewed with some caution. The assumptions employed in this analysis, however, were necessary because of data limitations and are very similar in nature to the assumptions used in the majority of fiscal impact studies to date.

Comparison of the Fiscal Impact of Subdivisions with Conventional and Proposed Standards

This section compares the fiscal impact in terms of revenue, costs and net impact on the regional and local municipality of the alternative types of subdivisions. Two comparisons are undertaken:

- a comparison of a subdivision with Metropolitan conventional standards to one with Metropolitan proposed standards.

- a comparison of a subdivision with Ontario conventional standards to one with Ontario proposed standards.

In the next subsection, a comparison of the basic characteristics of the alternative subdivisions relevant to municipal finance is undertaken. Then, a comparison of the revenues generated by the alternative subdivisions is presented, followed by a similar comparison with respect to costs. Finally, the revenue and cost comparisons are put together in order to compare the net fiscal impact of the alternative subdivisions on local and regional governments.

i) Comparison of Characteristics of Alternative Subdivisions

Table 3 presents a comparison of the alternative subdivisions with respect to number of dwelling units, average household size, population and assessed values of dwelling units.

TABLE 3

COMPARISON OF SELECTED CHARACTERISTICS OF SUBDIVISIONS WITH CONVENTIONAL AND PROPOSED STANDARDS

Standard	Number of Dwelling Units[3]	Average Household Size[4] (persons)	Population (persons)[5]	Average Assessed Value per Dwelling Unit[6] (dollars)	Total Residential Assessment[7] ($000s)
Metropolitan[1]					
— Conventional	1 244	3.7	4 603	22 195	28 506
— Proposed	1 806	3.7	6 682	19 956	36 041
— % Difference	45.2	0	45.2	-12.9	26.4
Ontario[2]					
— Conventional	964	3.7	3 567	2 827	2 725
— Proposed	1 478	3.7	5 469	2 383	3 522
— % Difference	53.3	0	53.3	-15.7	29.2

1 City of Brampton
2 Town of Newcastle
3 As specified in the *Urban Development Standards* study.
4 Based on data provided by the Regional Municipality of Peel. Because comparable estimates were not available, Peel estimates were assumed to apply to the Town of Newcastle as well.
5 (Number of Dwelling Units) x (Average Household Size)
6 Based on data from Brampton and Newcastle assessment records.
7 (Average Assessed Value/Dwelling) x (Number of Dwelling Units)

Source: Derived by Clayton Research Associates

Highlights of Table 3 are as follows:

- Subdivisions with Metropolitan proposed standards are estimated to have 45.2% more persons and dwellings than subdivisions with Metropolitan conventional standards. Subdivisions with Ontario proposed standards are estimated to have 53.3% more persons and dwellings than subdivisions with Ontario conventional standards.

- The average assessed value per dwelling is estimated to be 12.9% lower in subdivisions with Metropolitan proposed standards compared to those in subdivisions with Metropolitan conventional standards. The average assessed value per dwelling is estimated to be 15.7% lower in subdivisions with Ontario proposed standards compared to those with Ontario conventional standards.

- The total residential assessment for the subdivisions with Metropolitan and Ontario proposed standards is estimated to be 26.4% and 29.2% higher, respectively, than for subdivisions with Metropolitan and Ontario conventional standards. The greater number of dwelling units in subdivisions with proposed standards more than offsets the lower average assessed value per dwelling unit in both Metropolitan and Ontario subdivisions.

ii) Comparison of Revenues Generated by the Alternative Subdivisions

Tables 4 and 5 compare the annual revenues generated by subdivisions with Metropolitan conventional and proposed standards and subdivisions with Ontario conventional and proposed standards, respectively.

TABLE 4

INCREMENTAL ANNUAL REVENUE ESTIMATES FOR SUBDIVISIONS WITH METROPOLITAN CONVENTIONAL AND PROPOSED STANDARDS[1]

Source of Revenue	Standards		Difference	
	Conventional	Proposed		
	($)	($)	($)	(%)
Local Municipality				
— Property Taxation	275 085	347 791	72 706	26.4
— General Support Grant	16 193	20 473	4 280	26.4
— Resource Equalization Grant	27 765	77 417	49 652	178.8
— Other	79 816	115 866	36 050	45.2
— Lot Levy (Annual Basis)[2]	164 119	238 263	74 144	45.2
TOTAL	562 978	799 810	236 832	42.1
Regional Municipality				
— Property Taxation	108 609	137 314	28 705	26.4
— Per Capita General Grant	46 030	66 820	20 790	45.2
— Per Capita Police Grant	69 045	100 230	31 185	45.2
— Per Capita Density Grant	9 206	13 364	4 158	45.2
— General Support Grant	16 058	22 089	6 031	37.6
— Resource Equalization Grant	10 269	28 633	18 364	178.8
— Other	3 682	5 346	1 664	45.2
— Lot Levy (Annual Basis)[2]	121 847	176 894	55 047	45.2
TOTAL	384 746	550 690	165 944	43.1
GRAND TOTAL	947 724	1 350 500	402 776	42.5
TOTAL REVENUE/DWELLING UNIT	762	748	-14	-1.8

1 City of Brampton, Regional Municipality of Peel, 1979

2 Lot levies are converted to an annual equivalent by applying a 5% real rate of interest to the lump sum lot levy.

Source: Derived by Clayton Research Associates

Highlights of Table 4 are as follows:

- Subdivisions with Metropolitan proposed standards are estimated to generate approximately $400 000 more revenue (i.e. $1.35 million compared to $0.95 million) for regional and local municipalities combined than subdivisions with Metropolitan conventional standards. This represents a difference of 42.5%.

- On a per dwelling unit basis, however, subdivisions with Metropolitan proposed standards are estimated to generate approximately $14 less revenue (i.e. $748 compared to $762) for regional and local municipalities combined than subdivisions with Metropolitan conventional standards. This represents a difference of 1.8%.

- With respect to source of revenue, the largest percentage difference between subdivisions with Metropolitan conventional and proposed standards is for the Resource Equalization Grant. The subdivision with proposed standards generates 179% more revenue from this source than does the subdivision with conventional standards. This is because the average assessed value per dwelling is less in subdivisions with proposed standards than in subdivisions with conventional standards and because the Resource Equalization Grant is related inversely to assessment.

- The source of revenue which shows the smallest percent difference between the two subdivision types is property taxation at 26.4%. This is the result of the lower average assessed values of dwellings in the subdivisions with proposed standards.

- The percentage differences between the two subdivisions in terms of revenue generated are the same (at 45.2%) for a number of sources. These include lot levies and the per capita grants received by the regional municipality. This is because revenues from these sources are related directly to the population or number of dwelling units in a subdivision.

Highlights of Table 5 are as follows:

- Subdivisions with Ontario proposed standards are estimated to generate approximately $354 000 more revenue (i.e. $1.129 million compared to $0.775 million) for regional and local municipalities combined than subdivisions with Ontario conventional standards. This represents a difference of 45.7%.

- On a per dwelling unit basis, however, subdivisions with Ontario proposed standards are estimated to generate approximately $40 less revenue (i.e. $764 compared to $804) for regional and local municipalities combined than subdivisions with Ontario conventional standards. This represents a difference of 5%.

- With respect to source of revenue, the largest percentage difference between subdivisions with Ontario conventional and proposed standards is for the Resource Equalization Grant. The subdivision with proposed standards generates 92% more revenue from this source than does the subdivision with conventional standards. This is because the average assessed value per dwelling unit is less in subdivisions with proposed standards than in subdivisions with conventional standards and because the Resource Equalization Grant is related inversely to assessment.

- The source of revenue which shows the smallest percentage difference between the two subdivision types is property taxation at 29.2%. This is the result of the lower average assessed values on dwellings in subdivisions with proposed standards.

- The percentage differences between the two subdivisions in terms of revenue generated are the same (at 53.3%) for a number of sources. These include lot levies and the per capita grants received by the regional municipality. This is because revenues from these sources are directly related to the population or number of dwelling units in a subdivision.

TABLE 5

INCREMENTAL ANNUAL REVENUE ESTIMATES FOR SUBDIVISIONS WITH ONTARIO CONVENTIONAL AND PROPOSED STANDARDS[1]

Source of Revenue	Standards		Difference	
	Conventional	Proposed		
	($)	($)	($)	(%)
Local Municipality				
— Property Taxation	190 112	245 700	55 588	29.2
— General Support Grant	13 129	16 968	3 839	29.2
— Resource Equalization Grant	43 476	83 552	40 076	92.2
— Other	27 430	42 057	14 627	53.3
— Lot Levy (Annual Basis)[2]	72 300	110 850	38 550	53.3
TOTAL	346 447	499 127	152 680	44.1
Regional Municipality				
— Property Taxation	148 661	192 129	43 468	29.2
— Per Capita General Grant	35 670	54 690	19 020	53.3
— Per Capita Police Grant	53 505	82 035	28 530	53.3
— Per Capita Density Grant	17 835	27 345	9 510	53.3
— General Support Grant	13 656	19 410	5 754	42.1
— Resource Equalization Grant	26 760	51 427	24 667	92.2
— Other	8 453	12 962	4 509	53.3
— Lot Levy (Annual Basis)[2]	123 633	189 554	65 921	53.3
TOTAL	428 173	629 552	201 379	47.0
GRAND TOTAL	774 620	1 128 679	354 059	45.7
TOTAL REVENUE/DWELLING UNIT	804	764	-40	-5.0

1 Town of Newcastle, Regional Municipality of Durham, 1979

2 Lot levies are converted to an annual equivalent by applying a 5% real rate of interest to the lump sum lot levy.

Source: Derived by Clayton Research Associates

iii) Comparison of Costs Associated with the Alternative Subdivisions

Tables 6 and 7 compare the operating and capital costs associated with subdivisions with Metropolitan conventional and proposed standards and subdivisions with Ontario conventional and proposed standards, respectively.

Highlights of Table 6 are as follows:

- Operating and capital costs for subdivisions with Metropolitan proposed standards are estimated to be approximately $400 000 higher (i.e. $1.47 million compared to $1.07 million) than for subdivisions with Metropolitan conventional standards. This represents a difference of 37.5%.

- On a per dwelling unit basis, however, operating and capital costs for subdivisions with Metropolitan proposed standards are estimated to be $46 less (i.e. $817 compared to $863) than for subdivisions with Metropolitan conventional standards. This represents a difference of 5.3%.

TABLE 6

INCREMENTAL ANNUAL COST ESTIMATES FOR SUBDIVISIONS WITH METROPOLITAN CONVENTIONAL AND PROPOSED STANDARDS[1]

Source of Costs	Standards		Difference	
	Conventional	Proposed		
	($)	($)	($)	(%)
Local Municipality				
— Operating Costs	510 606	697 588	186 982	36.6
— Capital Costs (Annual Basis)[2]	161 462	218 372	56 910	35.2
TOTAL	672 068	915 960	243 892	36.3
Regional Municipality				
— Operating Costs	256 198	371 915	115 717	45.2
— Capital Costs (Annual Basis)[2]	145 455	188 272	42 817	29.4
TOTAL	401 653	560 187	158 534	39.5
GRAND TOTAL	1 073 721	1 476 147	402 426	37.5
TOTAL COST/DWELLING UNIT	863	817	-46	-5.3

1 City of Brampton, Regional Municipality of Peel, 1979

2 Capital costs are converted to an annual equivalent by applying a 5% real rate of interest to the dollar amount of total capital costs.

Source: Derived by Clayton Research Associates

Highlights of Table 7 are as follows:

- Operating and capital costs for subdivisions with Ontario proposed standards are estimated to be approximately $340 000 higher (i.e., $1.11 million compared to $.77 million) than for subdivisions with Ontario conventional standards. This represents a difference of 43.8 percent.

- On a per dwelling unit basis, however, operating and capital costs for subdivisions with Ontario proposed standards are estimated to be $50 less (i.e., $749 compared to $799) than for subdivisions with Ontario conventional standards. This represents a difference of 6.3 percent.

The differences in operating and capital costs between the proposed and conventional subdivisions are the result of differences in population and the number of dwelling units. The *per capita* costs of many of the services provided by local and regional municipalities are the same for subdivisions with proposed and conventional standards[1]. For these services, cost differences between subdivisions with conventional and proposed standards are directly proportional to population differences.

[1]These services include: general government; police protection; road maintenance; snow removal and winter control; garbage collection and disposal; health; social assistance; recreation; property inspections; and planning development.

TABLE 7

INCREMENTAL ANNUAL COST ESTIMATES FOR SUBDIVISIONS WITH ONTARIO CONVENTIONAL AND PROPOSED STANDARDS[1]

Source of Costs	Standards		Difference	
	Conventional	Proposed		
	($)	($)	($)	(%)
Local Municipality				
— Operating Costs	273 482	406 736	133 254	48.7
— Capital Costs (Annual Basis)[2]	153 752	203 302	49 550	32.2
TOTAL	427 234	610 038	182 804	42.8
Regional Municipality				
— Operating Costs	245 896	377 012	131 116	53.3
— Capital Costs (Annual Basis)[2]	97 027	120 623	23 596	24.3
TOTAL	342 923	497 635	154 712	45.1
GRAND TOTAL	770 157	1 107 673	337 516	43.8
TOTAL COST/DWELLING UNIT	799	749	-50	-6.3

1 Town of Newcastle, Regional Municipality of Durham, 1979

2 Capital costs are converted to an annual equivalent by applying a 5% real rate of interest to the dollar amount of total capital costs.

Source: Derived by Clayton Research Associates

For other services, however, it is estimated that *per capita* operating and capital costs are less for the subdivisions with proposed standards. These services include:

- Fire protection where both operating and capital cost savings result from the density increases associated with the subdivisions with proposed standards;
- Transit where both operating and capital cost savings result from the density increases associated with the subdivisions with proposed standards;
- Street lighting where the operating costs are more closely associated with the differences in the number of street lights between the subdivisions rather than differences in population; and
- Public works where the capital costs of increasing the capacity of roads, water lines and trunk sewers are not directly proportional to the differences in the number of residents served.

iv) Overall Fiscal Impact

Table 8 outlines the differences with respect to the net fiscal impact of the alternative subdivisions.

Highlights are as follows:

- It is estimated that the subdivisions with Metropolitan conventional and proposed standards generate a fiscal deficit for the City of Brampton and the Regional Municipality of Peel. This result is not unusual. Many previous fiscal impact studies have found that residential development generates deficits to a municipality.[1] On an aggregate basis the size of the deficit is estimated to be virtually the same for the two alternative subdivisions with Metropolitan standards (approximately $126 000 for both).

- It is estimated that the subdivisions with Ontario conventional and proposed standards generate a small fiscal surplus to the Town of Newcastle and the Regional Municipality of Durham.

- Because of the dwelling unit differences associated with the alternative subdivision types, a more appropriate indicator for comparison is the net surplus or deficit per dwelling unit.

  Table 8 indicates that the subdivision with Metropolitan conventional standards generates a per dwelling unit deficit of $101 compared to $70 for a subdivision with Metropolitan proposed standards. Similarly, the subdivision with Ontario conventional standards generates a per dwelling unit surplus of $5 compared to $14 for the subdivision with proposed standards. Thus, the net fiscal impact of both Metropolitan and Ontario subdivisions with conventional and proposed standards is basically the same.

TABLE 8

COMPARISON OF ANNUAL NET FISCAL IMPACT ESTIMATES FOR SUBDIVISIONS WITH CONVENTIONAL AND PROPOSED STANDARDS

Standards	Revenues	Costs	Net Surplus (Deficit)	Net Surplus (Deficit) Per Dwelling Unit
	($)	($)	($)	($)
Metropolitan[1]				
— Conventional	947 724	1 073 721	(125 997)	(101.28)
— Proposed	1 350 500	1 476 147	(125 647)	(69.57)
Ontario[2]				
— Conventional	774 620	770 157	4 463	4.63
— Proposed	1 128 679	1 107 673	21 006	14.21

1 City of Brampton in the Regional Municipality of Peel, 1979
2 Town of Newcastle in the Regional Municipality of Durham, 1979

Source: Derived by Clayton Research Associates

[1]This fiscal deficit on residential development has gradually been found to be offset in part or entirely by the fiscal surplus on industrial and commercial development.

Conclusions

The purpose of this part of the review was to determine whether subdivisions employing the proposed standards recommended by the *Urban Development Standards* study generate less municipal revenue relative to costs than subdivisions with conventional standards.

For purposes of this analysis the municipal financial impacts of subdivisions with proposed and conventional standards were estimated for the City of Brampton in the Regional Municipality of Peel and for the Town of Newcastle in the Regional Municipality of Durham.

The conclusions reached are threefold:

- Subdivisions with proposed standards generate significantly more municipal revenue than do subdivisions with conventional standards, but involve a higher level of municipal costs as well.

- Overall, the net fiscal impact of subdivisions with proposed standards appears to be similar to that for subdivisions with conventional standards.

- Hence, in the case of the City of Brampton and the Town of Newcastle, the municipalities should be indifferent from the standpoint of fiscal impact between subdivisions having conventional or proposed standards.

While these findings are considered to be applicable to many other municipalities, differences among municipalities preclude automatic acceptance of these findings for each and every municipality in Ontario.

ENERGY IMPACT REVIEW

4. ENERGY IMPACT REVIEW[1]

Since publication of the *Urban Development Standards* study, interest in energy-efficient residential development has grown among developers and municipalities. The objective of this part of the review is to estimate the energy saved through the reduction in sewers, pavement, sidewalks, utilities, service connections and associated hardware required for the proposed Metropolitan and Ontario subdivisions described in *Urban Development Standards*. Some operating savings were also estimated.

The scope of this analysis was limited in the following ways:

- The four subdivision plans and the standards prepared for the *Urban Development Standards* study were used in the impact analysis. Energy embodiments of materials were drawn directly from the literature.

- The analysis was limited to the energy aspects of the four subdivisions. An analysis of aesthetic, social, environmental or other impacts was not attempted.

- No attempt was made to estimate the distribution of savings among homeowners, municipalities, developers or others to whom they may accrue.

- No analysis was made of infrastructure maintenance energy demands (e.g. road repair). Capital energy demands calculated excluded the energy required to make the machines used to manufacture the necessary materials and were limited to the energy embodied up to and including delivery to the site. Energy requirements to develop the site were not estimated.

Capital Energy Savings

The quantities of materials required for the four subdivisions considered in *Urban Development Standards* were from the original designs prepared for that study. Where sizes or types were not specified in the original materials list, they were obtained from manufacturers or distributors of the particular component or from city engineering departments.

The sum of energy embodied per unit of material multiplied by the quantity of the material gives the total energy embodiment of all the materials for the particular subdivision design, as delivered to the site.

The two proposed designs have narrower streets and lots than do the two conventional designs. In addition, other standards vary between the proposed and conventional. The capital energy savings for the proposed Ontario and Metropolitan subdivisions are 49.7 and 40.7 million Btu respectively, as indicated in Table 9. The proposed design for Ontario requires 44% less capital energy than the conventional design for such areas. The proposed Metropolitan subdivision design yields capital energy savings of 45.6% over conventional layouts. Not surprisingly, more than half of the savings result from the decreased need for materials associated with the narrower roads and lots.

Comparison of these energy savings with the energy demand for space heating gives an indication of the significance of these savings. The

[1]The detailed calculations used in this chapter are available upon request from the Local Planning Policy Branch.

average new house requires about 43 million Btu per year for space heating (end-use energy demand).[1] Assuming natural gas is used at an efficiency of 65% the delivered energy demand is 66 million Btu per year. The expected life of a house is about 60 years,[2] and the lifetime space heating demand (assuming the house is not upgraded) is, thus, 3 970 million Btu or the energy equivalent of 23 960 gallons of oil. The savings associated with the proposed subdivisions are, thus, 1% and 1.3% respectively of the lifetime space heating demand for the Metropolitan and Ontario designs.

TABLE 9

SUMMARY OF CAPITAL ENERGY SAVINGS ASSOCIATED WITH THE PROPOSED SUBDIVISION DESIGNS

	Ontario		Metropolitan	
Municipal Service	10^3 Btu/ Unit	% of Conventional	10^3 Btu/ Unit	% of Conventional
Roads	26 100	44.8	23 400	52.0
Sidewalks	8 100	37.3	5 000	29.4
Storm Sewers	5 400	52.9	4 700	58.8
Sanitary Sewers	2 600	53.1	1 700	44.7
Water Mains	3 500	39.3	2 200	31.4
Service Connections	3 200	60.4	3 500	64.8
Electric Utilities	800	21.1	200	6.7
TOTAL	49 700	44.0	40 700	45.6

The significance of the savings rises if more efficient houses are built or if houses are upgraded over time. For example, if the annual space heating demand was only 38 million Btu, then the infrastructure capital energy savings would be increased to 1.6% and 1.9% respectively of the lifetime space heating demand for the Metropolitan and Ontario designs. Upgrading to this level is fairly easy. This is an important point because upgrading of the dwellings is quite feasible while the subdivision design is, literally, set in concrete and offers no opportunity for retrofitting.

The significance of the savings can also be expressed in economic terms. At January 1, 1982 crude oil prices at the Toronto gate of $32.05/bbl, the indicated energy savings represent dollar savings for each household of about $225 and $275 respectively for the Metropolitan and Ontario proposed designs.

Operating Energy Savings

In addition to the capital energy savings associated with the proposed subdivisions, there may be some operating savings or losses. These may be

[1]Measured at the Division of Building Research, National Research Council of Canada, test house in Ottawa in the 1979-80 heating season. The house has a floor area of 1200 ft^2 and is built to the current Ontario building code. End-use energy is the energy which actually goes to heating the house after losses associated with furnace efficiency are deducted from the delivered energy demand. Delivered energy demand is the heat equivalent of the fuel purchased for the house.

[2]Ontario Ministry of Housing, *Saving Energy by Way of Site Design.* Project Planning Branch. Toronto, 1981.

particularly significant because they accumulate over the 60-year life of the subdivision and, once the pattern is determined by the subdivision design, these energy demands may be difficult to change.

The design of a subdivision affects the energy needed to operate street lighting and water pumping. It also affects the energy used by the urban transportation sector by affecting the density and, hence, distances between sources and destinations, and by affecting the relative feasibility of various transportation modes. Many of the operating energy demands depend upon factors which occur outside the subdivision and are, therefore, difficult or impossible to quantify, given only the four subdivisions considered in *Urban Development Standards*. The operating energy savings were, accordingly, considered in general terms.

i) Street Lighting

The energy required for street lighting depends on several factors including the type of bulbs used, the lighting level desired, and the area to be lit. The types of bulbs used does not depend on subdivision design. Although subdivision design and its implications on the social environment may affect the lighting level desired, the primary effect on street lighting energy use is the area to be lit. If the length of streets can be reduced, then so can the number of street lights required. Associated with a drop in the number of lights is a drop in the energy demand for lighting.

In the four subdivisions considered a greater amount of street lighting is required in the proposed than in the conventional designs. However, the proposed designs are developed to a higher density, so the lighting required per household is reduced. In the Ontario subdivisions, the lighting requirement per household over 60 years is 51.7 million Btu in the conventional designs and 35.4 million Btu in the proposed designs. Thus, 16.3 million Btu — the equivalent of 98 gallons of oil — would be saved by each household if the proposed design is used rather than the conventional one. At current Ontario average electricity costs to a municipality of 2.5¢/kWh, this saving amounts to about $52 per household over sixty years.

Savings are also associated with the proposed Metropolitan subdivision. The conventional Metropolitan energy demand for street lighting is 40 million Btu per household while the demand for the proposed design is only 31.4 million Btu. The savings associated with the proposed design over its 60-year life are, thus, the equivalent of almost 52.5 gallons of oil per household. At current Ontario average electricity costs, this saving amounts to about $27 per household over sixty years.

ii) Street Maintenance

Energy is required to maintain streets — for example, for snow removal and cleaning. The proposed subdivision designs have narrower lots and, therefore, a decreased street length per house. The energy required for street maintenance will, accordingly, be lower in these subdivisions than in the conventional ones.

iii) Water Pumping

Energy is also required to pump water from the treatment plant to each house. The energy demand is primarily determined by the desired water

pressure, the distance the water is to be transported, and the pipe diameter. If any of these are decreased, then the energy demand will be reduced.

In the proposed subdivision designs, the distance between dwellings is decreased and the pipe sizes are more closely matched to the actual requirement. Consequently, some small savings may be associated with the proposed subdivisions.

Conclusions

Significant reductions in the capital energy required result if the proposed subdivisions are developed rather than the conventional ones. These savings are more than 40% of the capital energy of the conventional subdivisions and amount to 1% to 1.3% of the space heating demand over the 60-year life of the subdivision.

Operating energy savings are of several types. Small savings are associated with street lighting, street maintenance and water pumping within the subdivision. Other operating savings, such as transportation savings, may accrue but will depend on the pattern of development around the subdivision and, thus, cannot be estimated from a consideration of the subdivision alone.